

REPORT DOCUMENTATION PAGE			Form Approved OMB NO. 0704-0188		
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1. REPORT DATE (DD-MM-YYYY) 24-12-2015		2. REPORT TYPE Final Report		3. DATES COVERED (From - To) 1-Sep-2014 - 31-Aug-2015	
4. TITLE AND SUBTITLE Final Report: Development System for FPGA-Controlled, Portable Processing Systems			5a. CONTRACT NUMBER W911NF-14-1-0548		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER 611103		
6. AUTHORS Maciej Noras			5d. PROJECT NUMBER		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAMES AND ADDRESSES University of North Carolina - Charlotte 9201 University City Boulevard Charlotte, NC 28223 -0001			8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS (ES) U.S. Army Research Office P.O. Box 12211 Research Triangle Park, NC 27709-2211			10. SPONSOR/MONITOR'S ACRONYM(S) ARO		
			11. SPONSOR/MONITOR'S REPORT NUMBER(S) 65095-EL-RIP.1		
12. DISTRIBUTION AVAILABILITY STATEMENT Approved for Public Release; Distribution Unlimited					
13. SUPPLEMENTARY NOTES The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other documentation.					
14. ABSTRACT The goal of this proposal was to establish an infrastructure for Field programmable Gate Array (FPGA) programming and development of algorithms which will be used in work on implementing custom data processing capabilities in small, ultra-low power, portable devices. This system is intended to support existing DoD projects and will enable work on future generation of "smart" electronics for use in military and other applications. The equipment will be used in the Laboratory for Instrumentation, Sensors and Power Electronics (LISPEL) at the University of North Carolina at Charlotte (UNCC). The platform will be based on a Peripheral Component					
15. SUBJECT TERMS field gate programmable array system					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	15. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT UU	b. ABSTRACT UU	c. THIS PAGE UU			Maciej Noras
					19b. TELEPHONE NUMBER 704-687-5053

Report Title

Final Report: Development System for FPGA-Controlled, Portable Processing Systems

ABSTRACT

The goal of this proposal was to establish an infrastructure for Field programmable Gate Array (FPGA) programming and development of algorithms which will be used in work on implementing custom data processing capabilities in small, ultra-low power, portable devices. This system is intended to support existing DoD projects and will enable work on future generation of “smart” electronics for use in military and other applications. The equipment will be used in the Laboratory for Instrumentation, Sensors and Power Electronics (LISPEL) at the University of North Carolina at Charlotte (UNCC). The platform will be based on a Peripheral Component Interconnect eXtensions for Instrumentation (PXI) system. This modular instrumentation architecture will allow for easy deployment of our data processing schemes on the devices. Right now all the processing is done after transmitting the acquired data to a computer. By moving the processing to the front end of the data gathering chain, we expect to reduce or completely eliminate communication between any external data gathering center and the peripheral devices collecting the information. Only the essential information will be conveyed, thus eliminating the data “clutter” haunting multi-node, data acquisition systems. In addition to the FPGA development capabilities the system will allow us to automate tests of the devices, as it includes all the necessary signal generation, control, and acquisition modules.

Enter List of papers submitted or published that acknowledge ARO support from the start of the project to the date of this printing. List the papers, including journal references, in the following categories:

(a) Papers published in peer-reviewed journals (N/A for none)

Received

Paper

TOTAL:

Number of Papers published in peer-reviewed journals:

(b) Papers published in non-peer-reviewed journals (N/A for none)

Received

Paper

TOTAL:

Number of Papers published in non peer-reviewed journals:

(c) Presentations

Number of Presentations: 0.00

Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

TOTAL:

Number of Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

TOTAL:

Number of Peer-Reviewed Conference Proceeding publications (other than abstracts):

(d) Manuscripts

Received Paper

TOTAL:

Number of Manuscripts:

Books

Received Book

TOTAL:

Received Book Chapter

TOTAL:

Patents Submitted

Patents Awarded

Awards

none

Graduate Students

<u>NAME</u>	<u>PERCENT_SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Names of Post Doctorates

<u>NAME</u>	<u>PERCENT_SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Names of Faculty Supported

<u>NAME</u>	<u>PERCENT SUPPORTED</u>	National Academy Member
Maciej Noras	0.00	
Aidan Browne	0.00	
FTE Equivalent:	0.00	
Total Number:	2	

Names of Under Graduate students supported

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Student Metrics

This section only applies to graduating undergraduates supported by this agreement in this reporting period

The number of undergraduates funded by this agreement who graduated during this period: 0.00

The number of undergraduates funded by this agreement who graduated during this period with a degree in science, mathematics, engineering, or technology fields:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and will continue to pursue a graduate or Ph.D. degree in science, mathematics, engineering, or technology fields:..... 0.00

Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale):..... 0.00

Number of graduating undergraduates funded by a DoD funded Center of Excellence grant for Education, Research and Engineering:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and intend to work for the Department of Defense 0.00

The number of undergraduates funded by your agreement who graduated during this period and will receive scholarships or fellowships for further studies in science, mathematics, engineering or technology fields: 0.00

Names of Personnel receiving masters degrees

<u>NAME</u>
Total Number:

Names of personnel receiving PHDs

<u>NAME</u>
Total Number:

Names of other research staff

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Sub Contractors (DD882)

Inventions (DD882)

Scientific Progress

The acquired equipment was put to use as intended.

Technology Transfer

none

The University of North Carolina at Charlotte
PI Report (Condensed Version) - Generated: 12/08/15 10.42.25

Fiscal Year: 2016 Period: 05 (Ending 11/30/2015)
Grant Title: 553193 - Development System for FPGA-Controlled, Portable P
Fund: 530193 - Development System for FPGA-Control
Agency: Army Research Office
PI: Noras, Maciej A.
Grant Type: G - Grant Category: F - Federal
Organization: 21800 - Engineering Technology
Project Start: 2014/09/01 Project End: 2015/08/31 Project Close: N
Budget Start: 2014/09/01 Budget End: 2015/08/31

Proposal Number (NORM Format): 14-0244

Indirect Cost Base: -
Indirect Cost Rate:% -
Indirect Cost Charge: -
Indirect Cost Distribution Code: -

Distribution of Facilities & Administrative Overhead Charges:

Fund	Organization	Account	Program	Percent of Distribution
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Inception to Date Fund Overview**Fiscal Year: 2016 Period: 05 (Ending 11/30/2015)****Fund: 530193 - Development System for FPGA-Control****Generated: 12/08/15 10.42.25**

	Revised Budget	ITD Activity	Encumbrances	MTD Activity	Remaining Balance
Salaries					
Faculty Release Time					
Faculty Summer Salary					
Post Doc Students					
Graduate Students Contract					
Student Temp Wages					
Undergraduate Students					
SPA Regular Salaries					
EPA Regular Salaries					
Overtime/Premium					
Non Student Regular Wages					
Work Study					
Total Salaries					
Benefits					
Workers Compensation					
Medical Insurance					
Optional Retirement					
Other Retirement					
Social Security					
Unemployment Compensation					
Other Benefits					
Total Benefits					
Supplies and Materials					
Supplies					
Non Capital Equipment	76,420.00	.00	.00	.00	76,420.00
Capital Equipment	.00	76,420.00	.00	-135.00	-76,420.00
Other Non Capital Resources					
Other Capital Resources					
Total Supplies and Materials	76,420.00	76,420.00	.00	-135.00	.00
Services					
Honorariums/Consulting Fees					

Participant Stipend
Other Participant Cost
Research Subcontracts Under \$25K
Research Subcontracts Over \$25K
Service Contracts
Domestic Travel
Foreign Travel
Fixed Purchased Services
Other Purchased Services
Other Services
Other Administrative Expenses
Fixed Charges
Administrative Fees

Total Services

Tuition and Fees

Transfers-Out

Utilities

Other Non-Operating Expenses

Accounts Not Applicable

Total Direct Expenses	76,420.00	76,420.00	.00	-135.00	.00
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Facilities and Admin

Total Expenses	76,420.00	76,420.00	.00	-135.00	.00
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YTD Fund Overview**Fiscal Year: 2016 Period: 05 (Ending 11/30/2015)****Fund: 530193 - Development System for FPGA-Control****Generated: 12/08/15 10.42.25**

	Revised Budget	YTD Activity	Encumbrances	MTD Activity	Remaining Balance
Salaries					
Faculty Release Time					
Faculty Summer Salary					
Post Doc Students					
Graduate Students Contract					
Student Temp Wages					
Undergraduate Students					
SPA Regular Salaries					
EPA Regular Salaries					
Overtime/Premium					
Non Student Regular Wages					
Work Study					
Total Salaries					
Benefits					
Workers Compensation					
Medical Insurance					
Optional Retirement					
Other Retirement					
Social Security					
Unemployment Compensation					
Other Benefits					
Total Benefits					
Supplies and Materials					
Supplies					
Non Capital Equipment	76,420.00	.00	.00	.00	76,420.00
Capital Equipment	-76,555.00	-135.00	.00	-135.00	-76,420.00
Other Non Capital Resources					
Other Capital Resources					
Total Supplies and Materials	-135.00	-135.00	.00	-135.00	.00

Services**Honorariums/Consulting Fees**

Participant Stipend					
Other Participant Cost					
Research Subcontracts Under \$25K					
Research Subcontracts Over \$25K					
Service Contracts					
Domestic Travel					
Foreign Travel					
Fixed Purchased Services					
Other Purchased Services					
Other Services					
Other Administrative Expenses					
Fixed Charges					
Facilities and Admin					
Administrative Fees					
Total Services					
Tuition and Fees					
Transfers-Out					
Utilities					
Other Non-Operating Expenses					
Accounts Not Applicable					
Total Direct Expenses	-135.00	-135.00	.00	-135.00	.00
Facilities and Admin					
Total Expenses	-135.00	-135.00	.00	-135.00	.00

YTD Expense Detail
Fiscal Year: 2016 Period: 05 (Ending 11/30/2015)
Fund: 530193 Development System for FPGA-Control
Generated: 12/08/15 10.42.25

Fiscal Year	Fiscal Period	Document #	Activity Date	Encumb Amount	YTD Activity Description	User Id
Account Type: Supplies and Materials						
Account: 944085 (944000) Fabricated Equipment						
2016	05	I0535102	2015/11/03	.00	-135.00 National Instruments Corporation	SCALLAWA
			2015/11/13	.00	135.00 National Instruments Corporation	SCALLAWA
* Total Account 944085				.00	.00	
Account: 944520 (944000) Engineer/Draft Equip Cap 2-8yr life						
2016	05	DL011376	2015/11/25	.00	-135.00 Overpayment to vendor	PABOETTC
* Total Account 944520				.00	-135.00	
* Total Account Type Supplies and Materials				.00	-135.00	
Total Expenses				.00	-135.00	

YTD Labor and Benefit Expense Detail

Fund:
Generated: 12/08/15 10.42.25

Fiscal							Trans	Document	Payroll	Payroll		Trans
Year	Id	Name	Account	Account Desc	Position	Document	Date	Date	Event	Number	Hours	Amount